Bacteria -> Gram+ -> Coccus -> Streptococcus

* Do not have a catalase
* Classify based on Hemolysis
  + α – Incomplete hemolysis (green)
  + β – Complete hemolysis (clear)
  + γ – No observable hemolysis
* Lancefield groups subdivide even further
* Each serotype has a unique M-protein
  + Distal portion binds fibrinogen to block the C3 convertase
  + Proximal portion binds factor H to block alternative pathway

*Streptococcus pyogenes (GABHS)*

* Bacitracin sensitive
* Over 130 M-types

**Virulence Factors**

* Adherence
* Immune Evasion
* Invasion and Spread
* Strep toxic shock syndrome

**Diagnosis**

* Culture from swab of tonsils and pharynx
* Rapid Antigen Detection Test
  + Streptex
  + Optical Immunoassay
* DNA

**Transmission**

* Contact with carriers or Aerosol

**Pharyngitis / “Strep Throat”**

* Rapid onset of sore throat
* Enlarged tonsil with patchy exudate
* Palpable, Tender lymph nodes
* No cough or flu-like symptoms
* Strawberry tongue and soft palate petechiae
* Complications
  + Tonsillar Abscess
  + Cervical Adenitis (must drain)
* Treatment
  + Pen V, Cephalosporin, Macrolides, Benzathine Pen G
  + Only treat confirmed cases

**Scarlet Fever <- untreated pharyngitis**

* Exotoxins in bloodstream induce inflammation
* Fever
* Sandpaper rash – rough sweat glands
* Pastia’s Lines – Reddish around skin folds
* Strawberry and Raspberry Tongue
* Desquamation of hands and feet

**Pyoderma/Impetigo**

* Children 2-5 during summer time
* Papule->Vesicle->Pustule->Thick Crust
* Fluid is honey-colored
* T: Penicillin, Topical mupirocin

**Erysipelas**

* Inflammation of skin with raised, demarcated localized erythema
* T: Penicillin

**Cellulitis**

* Inflammation of skin what is NOT raised or has distinct margins
* T: Penicillin

**Necrotizing Fasciitis**

* Flesh-eating disease
* Skin becomes dark then blue
* Bullae forms with yellowish fluid
* High fever and extreme prostration
* Virulence Factors
  + Hyaluronidase, M protein, Hemolysins O and S
* T: IV antibiotics or Debridement

**Streptococcal Toxic Shock Syndrome**

* Streptococci in the bloodstream
* Hypotension with 2 more symptoms
* T: Clindamycin or Pen G or Debridement

**Pneumonia**

* Abrupt onset with chills and fever

**Puerpural Sepsis “childbed fever”**

* Severe abdominal pain after childbirth

**Lymphangitis**

* Systemic involvement including chills, fever, and headache

**Acute Rheumatic Fever <- GABHS pharyngitis**

* Rheumatic Carditis without bacteria
* Insuffiency murmur
* Chronic Valvular Disease
* Rheumatic Polyarthritis – migrates to joints
* Syndenham’s Chorea/St. Vidas’ Dance
  + Rapid involuntary, non-repetitive tics
* T: limit pharyngitis with >10 day therapy

**Acute Post-Streptococcal Glomerulonephritis**

* Results from immune complexes in glomeruli
* Progressive, irreversible loss of renal fxn
* T: Benzathine Pen G, Supportive care

Bacteria -> Gram+ -> Coccus -> Streptococcus

*Streptococcus agalactiae (GBS)*

* Bacitracin resistive
* Has 9 serotypes
* Capsule blocks phagocytosis

**Virulence Factors**

* Β-hemolysin/cytolysin

**Transmission**

* Asymptomatic colonizer of genital and GI
* Presence between weeks 35-37 gestation is problematic

**Neonatal Disease (Early Onset)**

* Most common (1 week after birth)
* Fulminant pneumonia, septicemia, high mortality

**Neonatal Disease (Late Onset)**

* Less common (1 wk – 3 mo)
* Meningitis, Bacteremia, Osteoarthritis
* Could result in neurologic complications

**Adult Disease**

* Rare, but possible if have risk factors

**Diagnosis**

* Vaginal and rectal swabs from pregnant
* Culture in blood-containing selective medium
* CAMP test for further testing
  + Look for “arrowhead”pattern
* If maternal, Rapid Ag test or NAAT
* If neonatal or adult, visualization or culture

**Treatment**

* Penicillin/Ampicillin
* Vancomycin/Clindamycin if Pen allergic
* Need prophylactic treatment and IVIg

*Streptococcus pneumonia*

* Lancet-shaped, diplococcic
* Optochin-sensitive
* Easy horizontal transfer of genetics
* Most common in children
* 90 different serotypes

**Diseases**

* Pneumonia
  + Rapid onset, shaking chills, fever, cough with blood-tinged sputum
* Otitis media
* Bacteremia – 30% fatal in adults
* Meningitis

**Virulence Factors**

* Pneumolysin -> forms pores -> inflammation
* IgA protease -> forms fab fragments to stop phagocytosis
* Capsule – main virulence factor
* Neuraminidase
* Hyaluronidase
* Autolysin
* Choline-binding proteins
* Pneumococcal Surface Proteins
* Teichoic Acids

**Pathogenesis**

* Produce H2O2 to damage host
* Phase variation
  + Can change their capsule to induce different virulence patterns

**Diagnosis**

* Direct Gram sain
* Culture
* Ag detection

**Treatment**

* Fluoroquinolone or Vancomycin
* Typically resistant to Penicillin and Macrolide
* Vaccine
  + Conjugated for children
  + Polysaccharide for adults

*Enterococcus faecalis & Enterococcus faecium*

* Grow in harsh conditions
* Found in GI, urinary tract and vagina
* Virulence factors
  + UTI, peritonitis, endocarditis
* T: β-Lactam and aminoglycoside

*Viridans Streptococcus*

* Optochin resistant
* Found in oral cavity
* Native valve subacute bacterial endocariditis
  + Enters blood after dental procedure
* T: IV penicillin for 4-8 weeks